

(19) World Intellectual Property Organization
International Bureau



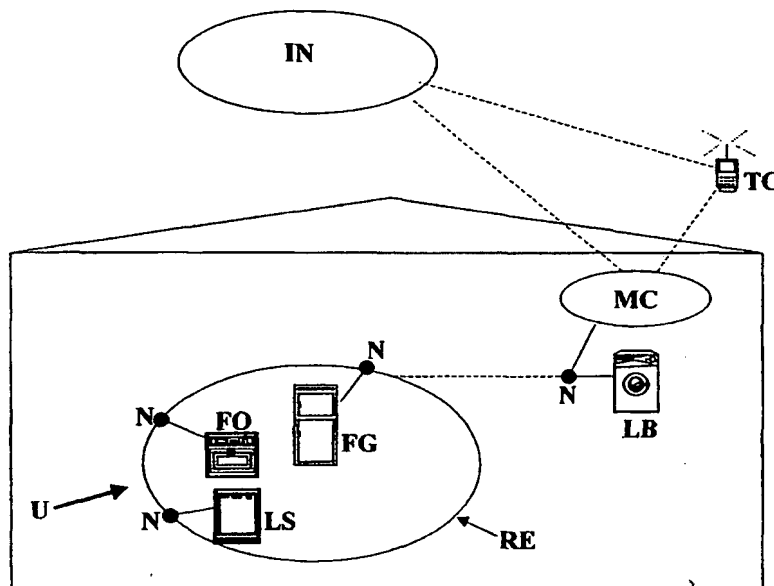
(43) International Publication Date
19 April 2001 (19.04.2001)

PCT

(10) International Publication Number
WO 01/28068 A1

- (51) International Patent Classification⁷: H02J 13/00 (81) Designated States (*national*): AE, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (21) International Application Number: PCT/IB00/00095
- (22) International Filing Date: 1 February 2000 (01.02.2000)
- (25) Filing Language: Italian
- (26) Publication Language: English
- (30) Priority Data:
TO99A000891 13 October 1999 (13.10.1999) IT
- (71) Applicant (*for all designated States except US*): WRAP S.P.A. [IT/IT]; Viale Aristide Merloni, 47, I-60044 Fabriano (IT).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): AISA, Valerio [IT/IT]; Via Serraloggia, 78/A, I-60044 Fabriano (IT).
- (74) Agent: DINI, Roberto; Merloni Elettrodomestici S.p.A., Ufficio Brevetti e Marchi, Via Pinerolo, 25, I-10060 None (IT).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM FOR MONITORING AND CONTROLLING A SET OF HOUSEHOLD APPLIANCES



(57) Abstract: A system for monitoring and controlling a set of power users, in particular household appliances, which users (U) are connected to a first communication network (RE) through appropriate interfacing means (N) for the exchange of information and/or instructions, where transmitter/receiver means (MC) connected to said first communication network (RE) are provided for establishing a communication channel to a second remote network (IN) and/or remote terminal (TC). According to the present invention, said transmitter/receiver means (MC) are associated to one of said electric users (LB) and share one of the interfacing means (N) associated to said user (LB).

WO 01/28068 A1

SYSTEM FOR MONITORING AND CONTROLLING A SET OF HOUSEHOLD APPLIANCES

DESCRIPTION

5 The present invention relates to a system for monitoring and controlling one or more electric users, in particular household appliances, where said users are connected to a first communication network through appropriate interfacing means for the exchange of information and/or commands, where transmitting/receiving means connected to said first communication network are provided for establishing a communication channel to
10 a second remote network and/or remote terminal.

As it is known, home automation, i.e. the exploiting of electronic technology in the household environment aiming at a reduction of managing costs for various users and the development of new comfort opportunities, is becoming more and more a reality. This is substantially due to:

- 15 - a growing diffusion of electronic consumption equipment, such as video-recorders, HI-FI systems, satellite receiver systems, safety and intrusion-proof systems, personal computers, mobile telephones, etc.
- recent considerable developments related to household appliances control systems based on the use of microcontrollers and new sensors, which are capable of dialog
20 with the environment outside;
- a progressive establishment of standard communication buses, i.e. sets of rules defining information exchange procedures from the various household appliances to the physical means through which such information are transmitted.

Particularly important, with reference to the last point, is the communication means
25 establishing itself as a standard in the household environment, i.e. the so-called power line, which is the power supply mains itself, to which information can be sent in the format of amplitude or frequency modulated small signals. The use of such a means, in fact, allows connection of household appliances to the power mains without the need of

implementing any new or special wiring systems.

As a result, new opportunities based on the employment of the power line have arisen in connection with the problems related to a rationalization of household power consumptions and a more efficient handling of the information associated to household electric users.

Remote control systems for household electric users are also known, which employ communication means for communicating with a specific household appliance or the household power mains for controlling operation of one or more household appliances.

The document IT.TO98A000134 issued in the Applicant's name discloses a system for the monitoring and remote technical service of household appliances pertaining to a household environment, which comprises a monitoring device capable of collecting - through a local network connected to said users - functional, diagnostic and statistical information generated by and transmitted from said users to said local network, and storing them in an appropriate memory. Such a monitoring device comprises appropriate means, in particular a GSM modem for receiving and managing the information received from the household appliances, where transmission of said information can take place at local level, i.e. directly to the consumer; at remote level inside the household environment, such as to a personal computer eventually available in such an environment adequately interfaced to said local network; finally at remote level outside the household environment, i.e. to a specific service centre.

In Figure 1 a system for the monitoring and remote service of household appliances is shown by way of example, representing a set of electric users consisting of household appliances, such as a laundry washing machine LB, an oven FO, a refrigerator FG and a dishwasher LS. Such a set of electric users U is connected to a local "power line" network RE, which has a telephone node NT corresponding to the above mentioned monitoring and controlling device and will then provide for transmission-reception of instructions and control through external systems.

Household appliances FO, LS, FG, LB will also be indicated in the following, since they

are equipped with electronic control devices capable of complex functions, either as household appliances or "smart" users.

This communication system is known and allows information exchange between various interfacing modules indicated with N, through the same power supply cable, i.e. without
5 requiring implementation of an extra wiring system in the house.

This interfacing module N forms the "communication node" through which each device connected to it is able to exchange information with the outside through the known power line technique. Therefore, each communication node is equipped with appropriate interfacing means to the same communication network RE; moreover, it contains the
10 control logic managing both the communication protocols to the bus (in other words the rules governing the information exchange with other network nodes) and information exchange with the device associated to it.

The technology related to network communication nodes and relevant protocols is known (reference is made e.g. to household bus systems, such as LonWorks, CEBus,
15 EHS, EIB...); therefore it will not be further investigated here.

The telephone node NT contains a modem, not shown in Figure 1, through which the local network RE can communicate with an external network IN, e.g. Internet web, or directly, e.g. through WAP (Wireless Application Protocol) protocols, in order to draw information and transfer them to the local network RE and to the electric users U
20 connected with it.

In Figure 1 the telephone node NT is also apt to communicate with a mobile telephone TC.

Drawbacks arise in such a system due to the special supervision and control device corresponding to the telephone node NT of Figure 1, which is interfacing between the
25 local network and telecommunication means, the latter being either fixed or mobile phone means. Such a monitoring and control device has to provide for collecting all information and transmitting them to the outside or to the personal computer, so that the possibility of communicating with the household appliances is tied to the presence

of said monitoring device in a special node of the local network.

If a local power line network is available, through which the household appliances are able to intercommunicate, a new interfacing module has to be necessarily implemented on the local network in order to add the possibility of communicating outside, i.e. a new node, to which the monitoring and control device will be expressly connected, with a consequent additional cost. Moreover, such a monitoring device has to be physically allocated inside the house, with a consequent increase of overall dimensions and difficulties in choosing its right location. Since such a monitoring and control device is associated to the availability of a local household appliances network, a further drawback arises if the consumer has a reduced appliances set or just one household appliance, as it will be difficult for a consumer to consider initial implementation of such a monitoring and control device as it would be appropriate.

It is the object of the present invention to solve the above drawbacks and provide a system for monitoring and controlling a set of electric users, having a more efficient and improved performance.

In this frame, it is the main object of the present invention to provide a system for monitoring and controlling a set of electric users, which does not require additional new nodes to let the users connected to a local network communicate with remote stations.

A further object of the present invention is to provide a system for monitoring and controlling a set of electric users, which does not cause any difficulties of allocation in a household environment.

A further object of the present invention is to provide a system for monitoring and controlling a set of electric users, which ensures availability of remote communication also in the event of a minimum electrical users set.

In order to achieve such aims, it is the object of the present invention to provide a system for monitoring and controlling a set of electric users, incorporating the features of the annexed claims, which form an integral part of the description herein.

Further objects, features and advantages of the present invention will become apparent

from the following detailed description and annexed drawings, which are supplied by way of non limiting example, wherein:

- Fig. 1 shows a basic diagram of a system for monitoring and controlling a set of electric users, according to the known state of the art;
- 5 - Fig. 2 shows a basic diagram of a detail of the system for monitoring and controlling a set of electric users, according to the present invention;
- Fig. 3 shows a basic diagram of a detail of the system for monitoring and controlling a set of electric users of Figure 2.

10 In Figure 2 a system for monitoring and controlling a set of electric users is represented according to the present invention. This system reproduces the common parts according to the system shown in Figure 1, but in this figure the laundry washing machine LB is separated from the set of electric users U and is connected to the local network RE by means of an interfacing module N contained in a telephone node MC.

15 This telephone node MC, as it will be better illustrated with reference to Figure 3, contains a mobile phone modem MG, operating to GSM standard, and a communication node N interfacing with the local network RE. Thus, the telephone node MC will perform the functions of the telephone node NT of Figure 1 for the electric users U, operating in quite an analogous manner. However, such a telephone node MC is associated to a specific user U, in this instance the washing machine LB, which is
20 approached as if it were an interfacing module N between it and the local network RE.

Therefore, as it can be noticed, this event does no longer require apposite gateways, i.e. shared communication gates, to the external network IN, whereas it is rather the household appliances themselves, in the specific case the washing machine LB, which act physically as gateways, in virtue of the modems associated to them through
25 connection to the telephone node MC.

The telephone node MC, equipped with a modem MG, whose manufacture is known as such, is able to manage digital transmission and is used for remote transmission of information to a likely Service and Preventive Maintenance Centre for the various

household electric users.

TC also indicates an external GSM mobile telephone, which is capable of digital communication with the telephone node MC, in particular through SMS alphanumerical messages, which are more easily managed by the consumer.

5 The telephone node MC, as it will be seen in Figure 3, is equipped with appropriate means for:

- collecting at regular intervals through the power mains RE itself, functional, diagnostic and statistical information generated by the "smart" users, such as FO, LS, FG and LB, recognizing for each one of them the user they come from;
- 10 - storing said information on appropriate non volatile memory means;
- making said information subsequently available outside through the telephone line, according to appropriate procedures,.

In Figure 3 a detail of the laundry washing machine LB is represented along with the telephone node MC.

15 The telephone node MC is contained inside a top panel T of the washing machine LB. Said top panel T, also called "top" is removable, or, in other words, it may be added optionally to a laundry washing machine previously preset for operation on the power mains RE, i.e. preset to be associated to an interfacing module N, the same as for the oven FO or dishwasher LS and the washing machine LS itself shown in Figure 1.

20 To this purpose the above top panel T contains the telephone node MC, which contains in turn:

- a display module M1, equipped with a dedicated microcontroller MC1 able to manage a fluorescent display D, that is capable of displaying alphanumerical messages and communicate with an electronic control system C of the laundry
- 25 washing machine through an asynchronous communication line L;
- a modem module M2 consisting of the mobile phone module MG with a relevant aerial A and an interfacing module N, suitable for communication on power line networks, such as the local network RE, also comprising a microcontroller MC2 of

adequate power, which is duly managing the mobile phone modem MG and the interface module N, communicating at the same time with the display module M1 through the asynchronous serial line L.

- non volatile EEPROM memory means MNVT, for storing the data received from the power mains or from outside, which are particularly apt to obtain jointly with an appropriate software, such as contained in the program memory of the microcontroller MC2, an updated image of the information contained in the control means memory of the "smart" household appliances.

Both the modem module M2 and display module M1 contained in the top panel T of the washing machine LB dialog with the electronic control system C of the washing machine LB by means of a WRAP (Web Ready Appliance Protocol) protocol through the asynchronous serial line L, which is provided right for interfacing with the interface module N of the washing machine LB.

Therefore, the electronic control system C of the washing machine LB will see both the modem module M2 and display module M1 contained in the top panel T exactly like a standard communication node, whereas, vice-versa, both the modem module M2 and display module M1 contained in the top panel T will use the same communication procedures of the interfacing module N to the electronic control system C warranting its correct emulation.

This means that the telephone node MC emulating the interface module N can be interfaced to any other household appliance preset for connection to the local network RE through said interfacing module N.

The principle of a communication port or gateway associated to the washing machine LB can be clearly replicated also through any other electric user preset for communication on the network RE.

The electronic control system C comprises a microcontroller MC3 of its own and a non volatile memory MNVC .

The program of the microcontroller MC3 contains a WRAP (Web Ready Appliance

Protocol) protocol managing the appliance operation, in the specific case the laundry washing machine LB. Through this protocol, an external electronic device, such as the mobile telephone TC capable of communication through the asynchronous serial line L, e.g. the module N interfacing the network, will be able perform at any time, without
5 affecting correct operation of the household appliance, the following functions:

- reading any area of the memory RAM of the microcontroller MC3.
- writing any area of the memory RAM of the microcontroller MC3.
- reading any area of the non volatile memory MNVC.
- writing any area of the non volatile memory MNVC.
- 10 - total control of the household appliance, in the specific case the laundry washing machine LB, which becomes a peripheral or slave of the above external electronic device (master or supervisor), such as the mobile telephone TC.

The above five procedures interacting with the environment outside, which form the WRAP protocol basis, allow a household appliance implementing its capability of
15 connection to the local network RE and access possibility to Internet web through any gateway capable of managing the protocol TCP/IP.

It should be noticed how the power line transmission system pertaining to the network RE, though being able to reach a speed of 4800 bps, is featured by a much lower speed (typically lower than 1200 bps) due to interferences on the communication line.

- 20 On the contrary, with reference to data transmission through a mobile or conventional telephone line, much higher speeds can be reached for the conventional line (up to 56000 bps with the analog system and over 100000 bps with the digital system), whereas for mobile communication operation occurs presently at 9600 bps. but it is foreseen to have this speed increased of an order of magnitude with the system GPRS.
- 25 Therefore, in order to obviate to the speed difference, the information that the telephone node MC is able to collect and store are generated by the "smart" household appliances FO, LS, LB e FG, as previously described.

The control system of each "smart" household appliance is programmed, in fact,

according to known techniques, for storing at least diagnostic and statistical information at regular intervals in its non volatile memory means and then update their contents in time.

Moreover, the control system C of each household appliance can generate and send to
5 the telephone node MC functional information of various nature, such as related to the operation program or cycle activated by the consumer, to the progress status or step of said program, to the instructions or option imparted by the consumer, to the timing associated to activations and deactivations of individual electric loads, to likely abnormal behaviours of some components, etc.

10 Equally, the microprocessor MC2 of the telephone node MC is programmed to request at regular intervals (e.g. every 10 minutes or other time interval, eventually programmable through appropriate external means that may be associated to the same power line communication system), always through the communication line consisting of the power mains RE itself, such information that may become available from time to
15 time, which are generated by the control systems C of each "smart" household appliance; said information are collected in appropriate non volatile memory means MNVT available to the telephone node MC itself. Therefore, the "data base" associated to the memory means MNVT of the telephone node MC is consistently updated and forms the image of the information contents inside the memory means MNVC
20 pertaining to each "smart" household appliance.

The contents of said "data base" can be sent at regular intervals by the telephone node MC to a Service and Preventive Maintenance Centre for the above purposes. In fact, the telephone node MC can be programmed for sending at regular intervals (e.g. every 24 hours or other time interval, eventually programmable through appropriate external
25 means that can be associated to the power line communication system), to an external Service and Preventive Maintenance Centre called "data base", containing the information made available to the power network RE by various "smart" household appliances.

Said "data base" stored in the non volatile memory means of the telephone node MC can have access directly from outside through a call to the telephone node MC. In view of this possibility of interaction with the mobile telephone TC, the presence of said memory means MNVT of the telephone node MC, which perform a buffer memory
5 function or a buffering function between the external communication networks, i.e. Internet web IN or the mobile phone network where the mobile telephone TC generally operates at higher speeds, and the network RE, operating at a lower speed.

Thus, anyone having access from outside can view the status of the household appliances and users connected to the network RE at the speed allowed by the external
10 network wherefrom access is obtained.

This is particularly important, for instance in the event of a large Service Centre performing a large number of daily inspections and scanning a large number of local networks RE, since all waiting times saved will result in a considerable saving of total time and possibly make a practicable service.

15 The following is an example of a possible communication protocol between the mobile telephone TC and local network RE, i.e. the household appliances connected to it.

The communication protocol between the mobile telephone TC and "smart" household appliances, such as the oven FO through the GSM modem MG, is based on three instruction types as follows:

- 20 - Remote control commands
- Remote state monitoring
- Remote events signalling.

The possibility of defining likely additional specifications related to the features of the electric users is provided for all three instruction types.

25 Tables 1 reports a list of the household appliances connected to the network RE of Figure 1 with the example codes assigned to them.

The above list is only reporting the appliances represented in Figure 1, but a television set may also be implemented, intended as a means through which alphanumeric

messages sent through the mobile telephone GSM can be appropriately displayed, or a general Internet connecting device. More generally, codes may also be assigned to:

- other household appliances, such as dryers, microwave ovens, cooking hobs;
- household systems, such as conditioning systems, heating systems, safety systems, anti-intrusion systems, lighting systems, sprinkler systems.

TABLE 1	
Code	Electric User
LBx	Laundry washing machine
LSx	Dishwasher
FGx	Refrigerator
COx	Freezer
FOx	Oven

The codes reported on the first column are utilized during SMS message transmission for identifying the user (or users) referred to in the communication.

In the event, where a household environment has more than one of the same electric appliance, such as two washing machines, their differentiation will be obtained by means of a third character (indicated with "X" in the Table), which is a numerical character.

A coding example may be as follows:

LB0 : main laundry washing machine

LB1 : washing machine

OV0 : electric oven

The following Table 2 reports possible instructions from C1 to C11 for remote control of household electric users connected to the network RE.

This list containing the remote control basis of household users is indicated by way of non limiting example and known in a *per se* manner, with the exception of the instruction C11.

Each instruction is selected from the menus available on the mobile telephone TC,

which are automatically translated in the appropriate coded string of characters for transmission to the mobile modem MG of the telephone node MC.

Instructions for remote control may be as follows:

START (C1) Immediate start of operation cycle (wash, cooking, ...) of the household appliance and its normal execution.

STOP (C2) Immediate final stop of cycle execution of the household appliance.

PAUSE (C3) Immediate pause of household appliance operation.

PAUSE END PHASE (C4) Operation cycle pause at the end of a current work step.

DELAY (a,b,c) (C5) Delayed cycle start or instruction to end appliance operation.

10 *RESET (C6)* Cancellation of all setting information of the appliance operation cycle (program data + delay + ...). Execution of this instruction will force a STANDBY status of the appliance (independently from any previous status).

PROGRAM DATA (C7) MI (Manufacturer identifier) + proprietary information related to the appliance operation cycle. This instruction represents the most important element to differentiate between the various household appliances manufacturers.

START IF... Condition = true (C8) Starting cycle execution in the occurrence of a condition expressed by means of an appropriate parameter (or set of parameters).

SELFTEST (C9) Request of immediate execution for Selftest routine. In order to execute the instruction, the appliance should be in Standby status.

20 *GET param. (C10)* GET is an instruction to be followed at least by one of the following parameters:

- STATUS : request of the system current operation status
- CONFIG : returns the whole set of system configuration parameters

SEND A MESSAGE (TEXT...) (C11) Sends an alphanumerical message for continuous display (until it receives an appropriate local feedback from the consumer) on an available display element in the house, such as a TV set, appliance display, etc.)

The last two instructions (C10 and C11) differ from the other instruction for their general purpose; they concern the whole system.

In particular, instruction C10 GET CONFIG outputs the system configuration (number and type of available appliances, possible alarm systems, heating, lighting, etc, ...), which can be controlled with a remote procedure. These information are used for menu self-configuration of the GSM mobile telephone that has sent such an instruction.

- 5 In the specific instance of the instruction C11 SEND A MESSAGE (TEXT...), this is particularly important because a message will appear on the display of any household appliance adequately preset to this purpose, i.e. either equipped with a display or on the display D of the telephone node MC. The system in the mobile telephone TC for managing characters input is configured in line with this instruction C11 to accept
- 10 alphanumerical characters in a free format and send the message to the telephone node MC by pressing a transmission button.

Information related to the operation status of users U connected to the network RE can also be received on the mobile telephone TC. By way of example, these information may be:

- 15 *OFF (S1)* Household appliance not connected to the power mains.
- STAND BY (S2)* Household appliance connected to the power mains (ON) waiting for the programming data related to its operation cycle and a likely execution instruction.
- PROGRAMMED (S3)* The household appliance has already received the programming data for its operation cycle and is ready for a start instruction to execute the cycle.
- 20 *PROGRAMMED WAITING TO START (S4)* The household appliance has received a conditioned execution instruction (START IF...), is waiting for the performance of the relevant condition (delay, power, rate, ...) and is ready to execute a likely start instruction for immediate cycle execution (START).
- RUNNING (S5)* The household appliance is performing its operation cycle.
- 25 *CYCLE FINISHED (S6)* The household appliance has ended its operation cycle and is now in STAND BY status.
- FAILURE (S7)* Execution of the operation cycle has been definitively stopped due to an irreversible failure. If the appliance is equipped with an advanced self-diagnose system,

the kind of fauilure will be detailed as well.

PAUSE (S8) The household appliance cycle is in a temporary pause status waiting for an instruction to continue cycle execution.

CYCLE INTERRUPTED (S9) The household appliance has been forcedly induced to interrupt execution of its operation cycle definitively and is in STAND BY status.

RUNNING GOING TO PAUSE (S10) The household appliance has received a PAUSE END PHASE instruction and is waiting to end the running cycle step and take the PAUSE status.

SELFTTEST (S11) The household appliance is performing its self-test routine.

10 The request of the status of the whole control system for a set of electric users is performed through the instruction C10 GET STATUS as seen in Table 2.

Control system feedback of a set of electric users consists of an SMS message containing coded information on the whole system status to be displayed by the mobile telephone TC following appropriate decoding.

15 The codes associated to individual users U are indicated in the previous Table 1; the codes associated to an individual status are indicated between brackets (S1...S11).

At least four possible event types concerning a user U or an automatic home system (such as an alarm and/or safety system) can be signalled by the network RE through the telephone node MC:

20 - Notices E1: Information to the consumer about normal operation of the household appliance, such as "Washing has come to end!" "Cooking is over!"

- Warnings E2: Information of possible non dangerous problems for individuals (neither for individuals nor for the environment), which have occurred with reference to the household appliance, such as "Refrigerator door left open for the past 5 minutes".

25 - Alarms E3: Information of serious problems (which may cause serious damages to the consumer and/or environment), concerning the household appliance or in general the household environment, such as "Freezer temperature has reached a dangerous value for food preservation"; "Gas or water alarm"; "Intrusion-proof alarm".

- Failures E4: Information (optional, deactivated by default) on possible problems strictly connected to the appliance operation, which do not entail any safety problems but will affect performance of the operation cycle of the household appliance itself, such as "Washing machine does not take water in!", " Dishwasher pump fault!"

5 "Refrigerator temperature sensor fault!"

When such an event occurs, a call is placed to one or more GSM mobile telephones TC only if pertaining to a type (event E1, E2, E3 and E4) preliminarily enabled by the consumer through a remote control, such as through the mobile telephone TC or appropriate local configuration means. Information are only sent to enabled mobile
10 telephones TC. In order to enable a mobile telephone TC, it is necessary to input its relevant number in the telephone node memory MC through an appropriate local installation procedure.

Therefore, the menu of the receiving GSM mobile telephone TC should provide the possibility of enabling/disabling transmission of the messages generated by any events
15 associated to the control system of a set of electric users.

The message sent by the telephone node MC consists of a normal string of alphanumeric characters (standard SMS message), expressing an information contents coherent with the event just occurred. As a result, such a message is entirely managed by the control system of a set of electric users.

20 Finally, it is also possible to communicate setting parameters defining information exchange procedures between the electric users system and the mobile telephone TC, which ensure the remote control of the system and are primarily related to the telephone node MC.

The number of setting parameters depend on the complexity of the electric users system
25 and dialog sophistication with the mobile telephone TC remotely connected with it.

From the above description the features of the present invention are apparent, and also its advantages are clear.

Advantageously, the system for monitoring and controlling a set of electric users

described by way of example allows the removal of one of the network nodes incorporating the mobile phone gateway in one of the household appliances, in particular the laundry washing machine.

The system for monitoring and controlling a set of electric users according to the present invention is particularly advantageous as it can be incorporated in the washing machine upper panel or top. In fact, said top is optional, so the consumer can initially purchase a laundry washing machine that is only preset for interaction with a power line network and for the use of functions locally available, such as managing power consumption. The possibility of communicating through mobile phone connection, such as its control through a mobile telephone, can be added later to the local network, simply adding the top to the machine.

This is also quite advantageous considering the possibility for the consumer of adding a communication means with the environment outside in a comfortable compact manner also in the instance of a minimum household appliance set, i.e. even if only a laundry washing machine is available, instead of waiting for having a more consistent appliances set to implement a communication function with the environment outside.

It is clear that many changes are possible for the man skilled in the art to the system for monitoring and controlling a set of electric users, described by way of example, without departing from the novelty spirit of the innovative idea, and it is also clear that in practical actuation of the invention the components illustrated may often differ in form and size and be replaced with technical equivalent elements.

The modem pertaining to the telephone node can be e.g. a conventional modem apt for communicating on the conventional PSTN (analog) or ISDN (digital) telephone line.

The mobile telephone may contain the protocol for communicating with the local network in an internal memory, i.e. the protocol is already integrated in the mobile telephone or contained in special SIM cards. The instructions from said protocol may also be unloaded from remote sources, such as special Internet web sites, using WAP technologies.

Without departing from the present invention, the telephone node, in particular a mobile one, may also be coupled to other devices associated either internally or externally to said household appliance, sharing its resources, such as the interface module or memory resources.

CLAIMS

1. A system for monitoring and controlling one or more electric users, in particular household appliances, in which said electrical users (U) are connected to a first communication network (RE) through appropriate interfacing means (N) for the exchange of information and/or instructions, where transmitter/receiver means (MC) connected to said first communication network (RE) are provided for establishing a communication channel to a second remote network (IN) and/or a remote terminal (TC), characterized in that said transmitter/receiver means (MC) are associated to one of said electric users (LB) and share one of the interfacing means (N) associated to said electrical user (LB).
2. A system for monitoring and controlling a set of electric users, according to claim 1, characterized in that said transmitter/receiver means (MC) comprise interfacing means (N).
- 3 A system for monitoring and controlling a set of electric users, according to claim 2, characterized in that said interfacing means (N) communicate simultaneously with the transmitter/receiver means (MC) and a control system (C) of the electric user (LB).
4. A system for monitoring and controlling a set of electric users, according to claim 3, characterized in that said transmitter/receiver means (MC) comprise a modem (MG)
5. A system for monitoring and controlling a set of electric users, according to the previous claims, characterized in that said modem is a mobile phone modem, in particular GSM.
6. A system for monitoring and controlling a set of electric users, according to claim 3, characterized in that said transmitter/receiver means (MC) are incorporated in a structural element (T) of the electric user (LB) of which they share the interfacing means (N).
7. A system for monitoring and controlling a set of electric users, according to

claim 6, characterized in that said such structural element (T) can be added to the electric user (LB).

8. A system for monitoring and controlling a set of electric users, according to claim 7, characterized in that said such structural element (T) is a panel of the electric user (LB).

9. A system for monitoring and controlling a set of electric users, according to claim 6, characterized in that said such electric user is a laundry washing machine (LB) and said panel is panel that can be aggregated on the top section of said washing machine (LB).

10. A system for monitoring and controlling a set of electric users, according to claim 7, characterized in that said such transmitter-receiver means (MC) comprise non volatile memory means (MNVT) apt to store information entered by the control systems (C) of the electric users on the first network (RE).

11. A system for monitoring and controlling a set of electric users, according to claim 7, characterized in that said such non volatile memory means (MNVT) are apt for storing at regular intervals at least diagnostic and statistical information from the control systems (C) of the users.

12. A system for monitoring and controlling a set of electric users, according to claim 7, characterized in that said such memory means (MNVT) can be accessed directly from the second external network (IN) and/or from the remote terminal (TC).

13. A system for monitoring and controlling a set of electric users, according to claim 5, characterized in that said remote terminal (TC) is a mobile telephone (TC) apt for communicating with the first network (RE) through said mobile phone modem (MG).

14. A system for monitoring and controlling a set of electric users, according to claim 12, characterized in that said mobile telephone (TC) is apt to send alphanumerical messages (SMS) for controlling the electric users (U) and/or

containing information.

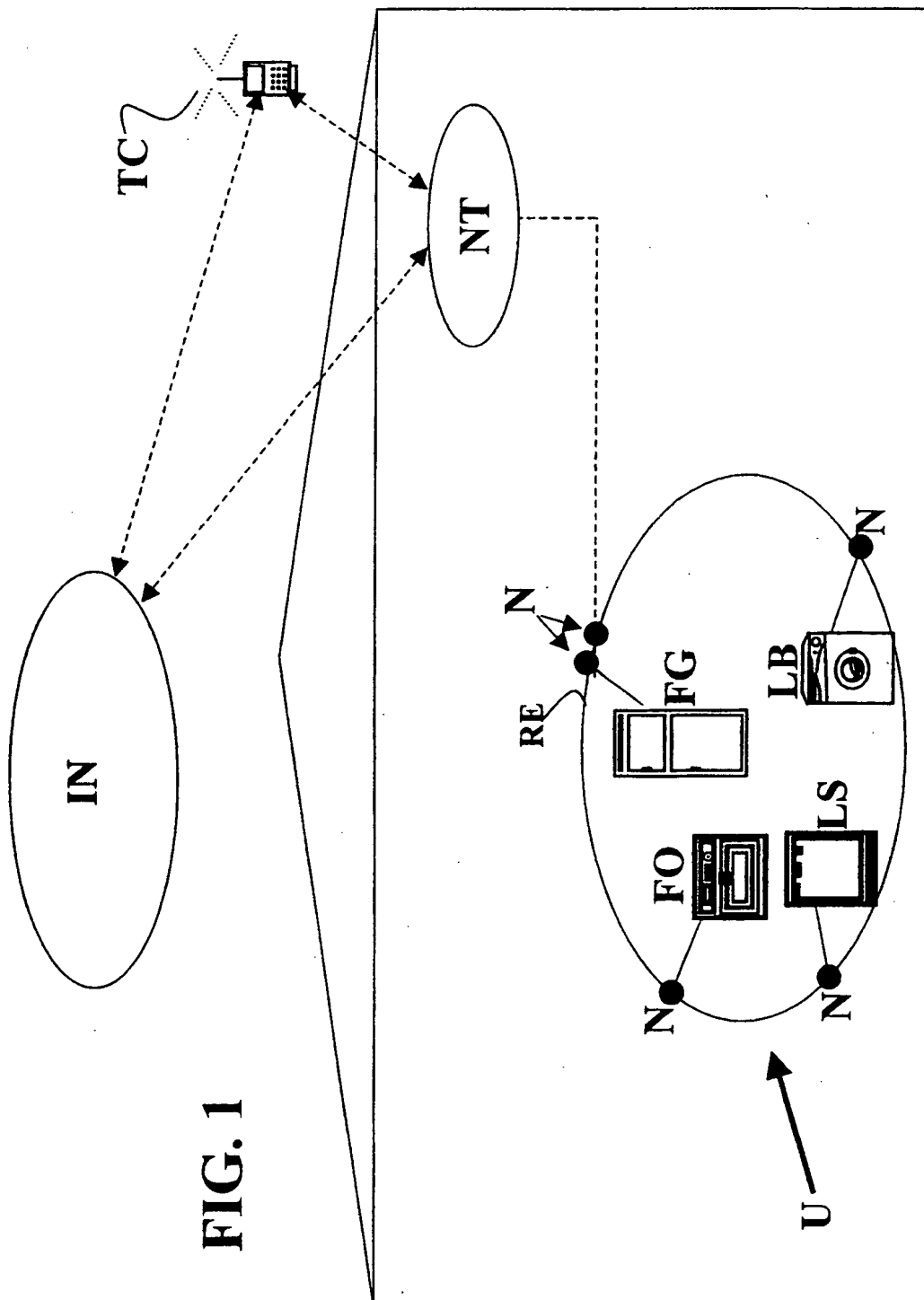
15. A system for monitoring and controlling a set of electric users, according to claim 13, characterized in that said electric users comprise means (D) for displaying the alphanumeric messages from the mobile telephone (TC).

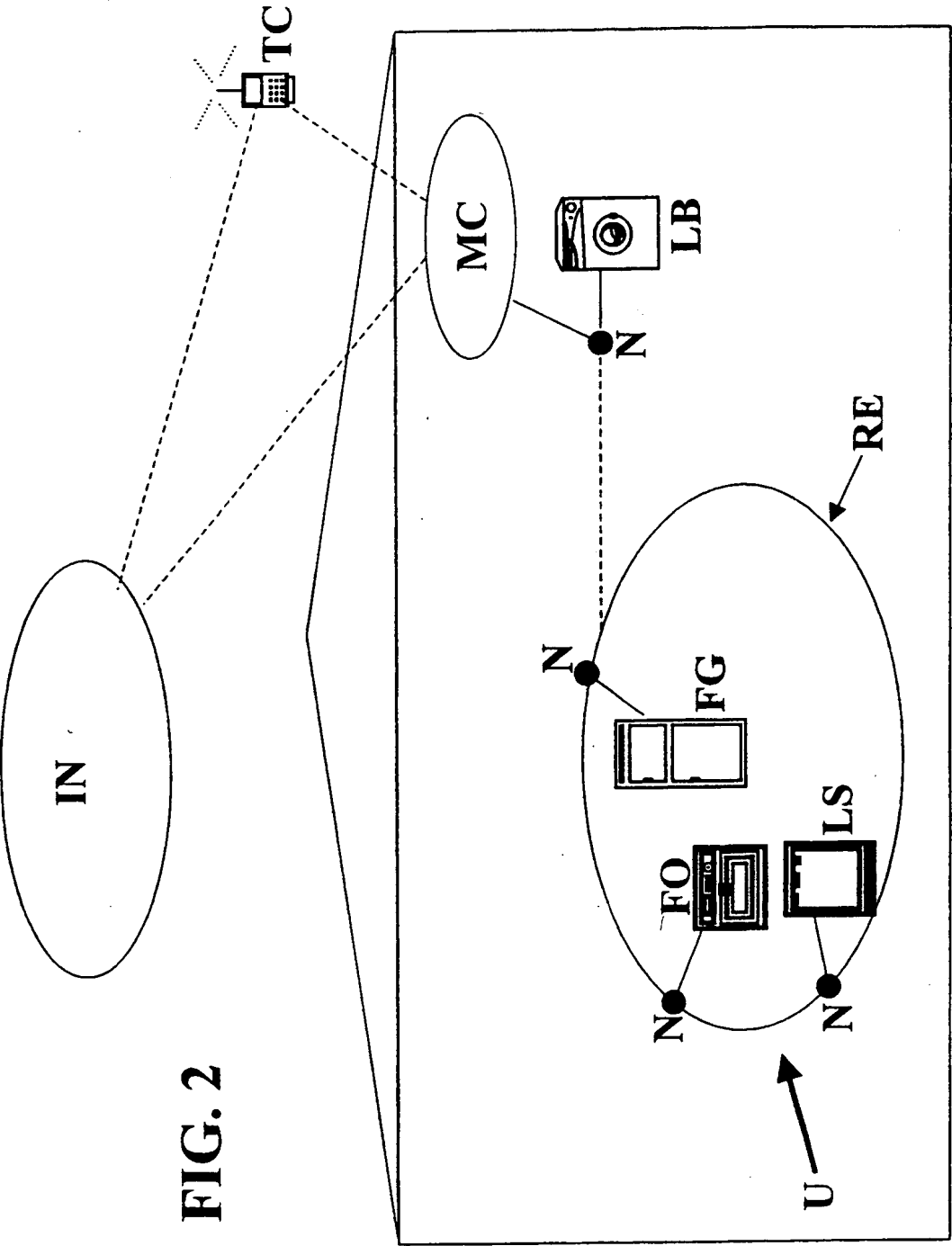
5 16. A device for monitoring and controlling a set of electric users, comprising at least a modem (MG) for connection to an external network (IN) and/or a remote terminal (TC), an interfacing module (N) for connection to a first local network (RE), characterized in that it is apt to share said interfacing module (N) with an electric user (LB).

10 17. A device for monitoring and controlling a set of electric users, according to claim 16, characterized in that it comprises display means (D) for the messages from the first local network (RE) and/or from the external network (IN) and/or from the remote terminal (TC) and/or from a control system (C) of said electric user (LB).

15 18. A device for monitoring and controlling a set of electric users, according to claim 16, characterized in that it comprises non volatile memory means (MNV) apt for performing a buffer memory function with respect to the information circulating on the first local network (RE).

20 19. A system for monitoring and controlling a set of electric users, according to claim 1, characterized in that said transmitter-receiver means (MC) establish a communication channel with a second remote network (IN) and/or a remote terminal for all electric users (U).





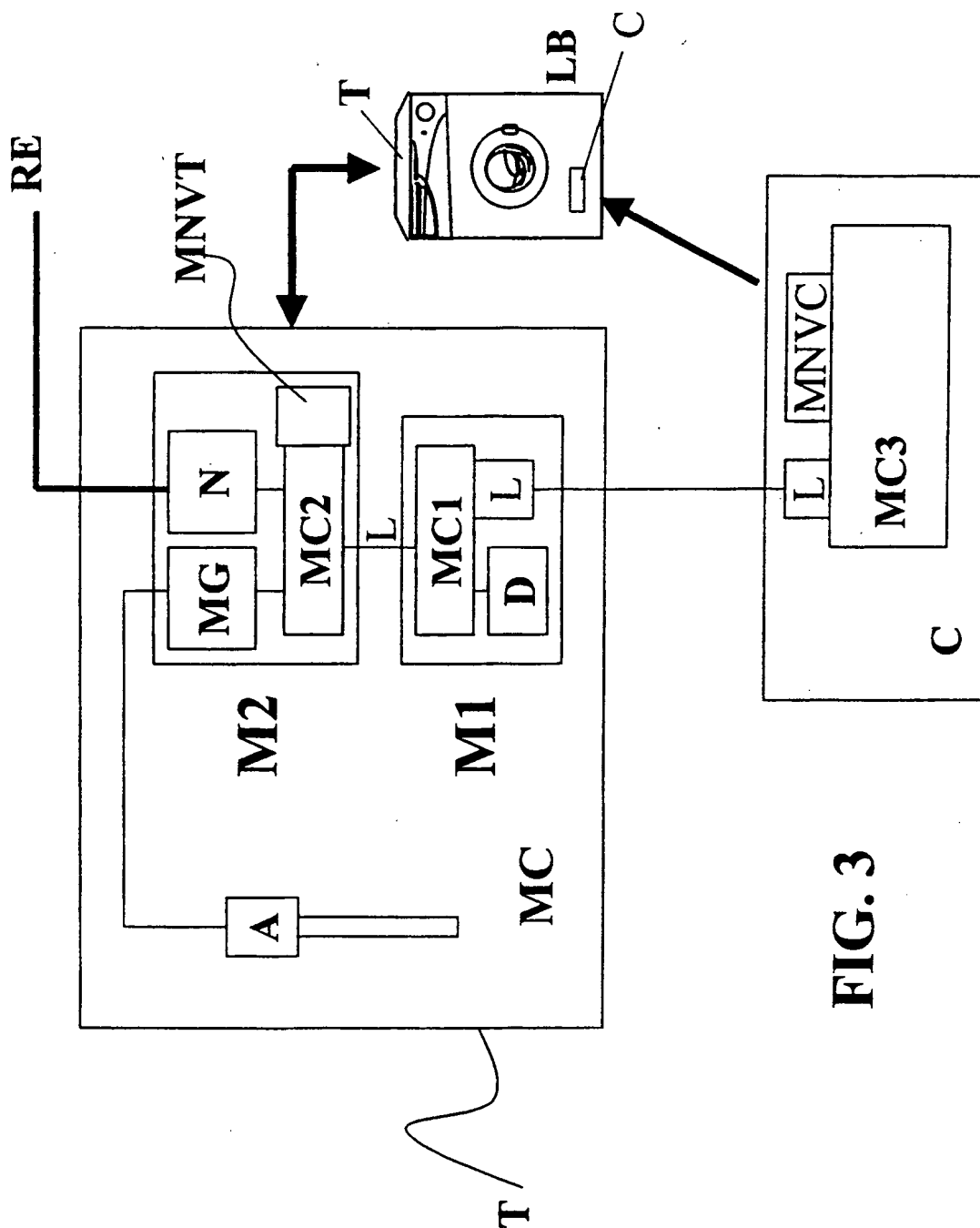


FIG. 3

INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/IB 00/00095

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H02J13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 99 43068 A (ELETTRODOMESTICI) 26 August 1999 (1999-08-26) cited in the application	1,16
A	page 3, line 21 -page 13, line 27; figure 1	3-5,10, 13,15, 17-19
Y	EP 0 391 316 A (INDUSTRIE ZANUSSI) 10 October 1990 (1990-10-10)	1,16
A	column 1, line 54 -column 7, line 6; figure 1	2,17,19
A	EP 0 620 631 A (ZELTRON SPA) 19 October 1994 (1994-10-19) column 2, line 44 -column 4, line 43 column 7, line 34 - line 40; figures 1-3	1,2, 16-19
	-/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

5 June 2000

Date of mailing of the international search report

13/06/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, T.x. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

Calarasanu, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 00/00095

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 748 105 A (AT&T IPM) 11 December 1996 (1996-12-11) column 4, line 20 -column 10291-5	1,5,13, 15-19
A	DE 44 34 044 A (BARMÉ) 28 March 1996 (1996-03-28) page 1, line 1 -page 2, line 60; figures 1,2	1,16,19

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/IB 00/00095

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9943068	A	26-08-1999	IT	T0980134 A	20-08-1999
			AU	2540699 A	06-09-1999
EP 391316	A	10-10-1990	IT	1234691 B	26-05-1992
EP 620631	A	19-10-1994	IT	PN930026 A	17-10-1994
			DE	69401025 D	16-01-1997
			DE	69401025 T	28-05-1997
			ES	2097565 T	01-04-1997
EP 748105	A	11-12-1996	US	6021324 A	01-02-2000
			JP	9027866 A	28-01-1997
DE 4434044	A	28-03-1996	NONE		